

CAREX BREVICULMIS (CYPERACEAE),  
NEW TO THE FLORA OF NORTH AMERICA

Lucas C. Majure

Florida Museum of Natural History and  
Department of Botany  
University of Florida  
P.O. Box 117800  
Gainesville, Florida 32611, U.S.A.  
lmajure@ufl.edu

Charles T. Bryson

USDA-ARS  
Southern Weed Science Laboratory  
P.O. Box 350  
Stoneville, Mississippi 38776, U.S.A.  
charles.bryson@ars.usda.gov

ABSTRACT

*Carex breviculmis*, a species native to Asia, Australia, and the Indian Subcontinent, was collected early in 2007 in Lauderdale County, Mississippi, U.S.A., at two areas in the city of Meridian. Further work in the area in the spring of 2008 revealed two more locations for this species. It was not known from North America prior to this discovery. Repeated trips to these sites revealed that this species appears to be established, maintaining viable populations from year to year, and could become weedy. We provide a detailed description and illustration of the species as well as a discussion of possible means and the implications of this introduction.

RESUMEN

*Carex breviculmis*, especie nativa de Asia, Australia, y el subcontinente Indio, fue colectado en el condado Lauderdale en la parte este central del estado de Mississippi, EE. UU. a principios de 2007, en dos localidades diferentes alrededor de la ciudad de Meridian. Trabajo adicional en el área durante la primavera del 2008 reveló dos nuevas localidades para la especie. *Carex breviculmis* no era conocida de la flora de Norte América antes de este descubrimiento. Varios viajes a estos sitios revelaron que la especie parece estar bien establecida, manteniendo poblaciones viables de año en año, pudiéndose convertir en una maleza. Discutimos los posibles medios y las implicaciones de su introducción. Además se presenta una descripción e ilustración detallada de la especie.

INTRODUCTION

*Carex breviculmis* R. Br., Ao-suge or blue sedge, was described from Australia in 1810 (Moore & Edgar 1976; Walker 1976). It is a widespread species native to the far-east and is known from east Afganistan, Australia, China, India, Japan, Korea, Malaysia, Nepal, New Guinea, New Zealand, Pakistan, Russia, and Taiwan (Hooker 1894; Goncharov et al. 1964; Ohwi 1965; Moore & Edgar 1976; Walker 1976; Koyama 1978; Egorova 1999; Kukkonen 2001). This species is a perennial that inhabits “open fields” and “sandy coasts” (Ohwi 1965), “exposed grassy slopes and water courses” (Goncharov et al. 1964), “open grasslands, forest margins” and other disturbed areas (Walker 1976; Koyama 1978), and mountainous areas with altitudes ranging from 2000–3900 m (Hooker 1894; Kern 1976; Kukkonen 2001). *Carex breviculmis* forms a complex, which can be found from “NW Himalaya to Japan and through Malaysia to Tasmania and New Zealand” (Kukkonen 2001).

*Carex breviculmis* is highly variable (Walker 1976; Koyama 1978). A number of species have been described within this complex that are now considered conspecific with *C. breviculmis*, e.g., *C. leucochlora* Bunge, *C. royleana* Nees (Ohwi 1965; Koyama 1978) or as distinct species (Egorova 1999; Kukkonen 2001). Additionally, numerous subspecies and varieties have been recognized in order to describe this variation (Ohwi 1965; Merrill 1968; Walker 1976; Koyama 1978). Egorova (1999) treats *C. breviculmis* and *C. leucochlora* as distinct species and separates them based on culm height, with *C. breviculmis* having culms from 1–2 cm in height and many, distinct veins on the perigynia. Egorova (1999) also states that the type specimens of *C. royleana* and *C. hypochlora* Freyn, are “identical” to *C. leucochlora*. Kukkonen (2001) places *C. brevilculmis* ssp. *royleana* in synonymy under *C. royleana*, but mentions that the *C. breviculmis* complex, which includes *C. leucochlora*, needs revision. Obviously, there is a great deal of confusion about taxonomic circumscription within this group. Based on inspection of specimens of *C. breviculmis* and *C. leucochlora* at MO and based



on the morphology of our specimens and current nomenclature in Tropicos (2008), we determined that our collections most closely correspond with *C. breviculmis*.

#### SPECIES DESCRIPTION

*Carex breviculmis* belongs to the species rich Old World section *Mitratae* and can immediately be distinguished from all other species in North America except *Carex caryophyllea* Latourrette by the tubercle-like structure at the achene apex. Prior to our discovery, the only species of *Carex* within this section known to U.S.A. was *C. caryophyllea*. *Carex caryophyllea*, an introduction from Europe, was discovered in Massachusetts in the northeastern U.S.A. in 1826; it is also found in D.C. and Maine (Standley 2002). *Carex breviculmis* is easily distinguished from *C. caryophyllea* by its caespitose habit and lowest inflorescence bract longer than the inflorescence. *Carex caryophyllea* is colonial from creeping rhizomes and has an inconspicuous lower inflorescence bract shorter than the inflorescence. In Mississippi, the habit of *C. breviculmis* is similar to species in section *Acrosystis*, but can be distinguished by its brown plant bases and long awned, green and hyaline pistillate scales when compared to the purple plant bases and acute, purple, green, and hyaline pistillate scales of *C. albicans* (Willd.) Spengel var. *australis* (L.H. Bailey) Rettig and *C. nigromarginata* Schweinitz. In vegetative plants, *C. breviculmis* might be confused with *C. blanda* Dewey or *C. leavenworthii* Dewey, both weeds of turf, lawns, flower beds, and disturbed sites (Bryson 1985; Bryson & Carter 2008). The leaf color in vegetative *C. breviculmis* plants is a darker green than in *C. leavenworthii* and the widest leaf is much narrower than the widest leaf in *C. blanda*. The following description is based on specimens collected in Meridian, Mississippi during 2007 and 2008.

***Carex breviculmis*** R. Br. Prodr. 242. 1810. (**Figs. 1–2**).

Plants densely caespitose from short rhizomes and fibrous roots; culms trigonous, 15–42 cm long, 0.7–0.9 mm wide, antrorsely scabrous; leaves dark to lime green, shorter than the culms, blades 3–20 cm long, 1.0–2.5 mm wide, leaf bases chestnut to light brown; inflorescence 3–4 spikes, pistillate spikes 2–3, 5.1–12 mm long, 3–4 mm wide, perigynia elliptic, 2.5–3.0 mm long, 0.8–0.9 mm wide, pubescent, 3–5 nerves per face, beak 0.8 mm long, bulging midway, pistillate scales 4.4–4.8 mm long, 0.7–1.2 mm wide, ovate to obcordate, acute to awned, awns 0.5–2.8 mm long, antrorsely scabrous, longest proximal; staminate spike 2.3–10 mm long, 1.2–1.8 mm wide, staminate scales 3.0–3.4 mm long, 0.8–1.1 mm wide, apex acute or awn to 0.5 mm long, antrorsely scabrous; bracts subtending lowest two pistillate spikes, sheaths 3–20 mm long, front hyaline, bract blades 1.2–10 cm long, 0.8–4.0 mm wide, proximal bract longer than inflorescence; achenes 1.4–1.6 mm long, 0.5–0.6 mm wide, trigonous, brown; stigmas 3, 0.5–0.7 mm long; style 0.5–0.7 mm long, swollen at base, base persistent forming swollen tubercle-like structure at achene apex; anthers 3, 2–2.2 mm long, 0.05 mm wide, filaments 2.8–3.2 mm long.

#### COLLECTIONS AND HABITAT DESCRIPTION

*Carex breviculmis* was first collected on March 23, 2007 from the Gypsy Cemetery in Meridian, Lauderdale County, Mississippi (Fig. 3). In 2007, the Gypsy Cemetery was heavily mowed during the summer and most of the *C. breviculmis* was observed growing under moderately shaded conditions beneath a large *Quercus nigra* L. near a fence line with much less maintenance than the interior of the cemetery. During a visit to the Gypsy Cemetery in May 2008, *C. breviculmis* was observed in shaded and open areas growing in *Cynodon dactylon* (L.) Pers. and *Stenotaphrum secundatum* (Walter) Kuntze turf and around grave markers. Additional specimens were collected on May 5, 2007 from a site adjacent to Interstate 20 and a railroad that runs perpendicular to Interstate 20 through Meridian. At this site, plants were growing in the middle of an old, rarely used trail that parallels the railroad under shaded conditions in sandy, mesic soils, where the canopy is dominated by trees and shrubs approximately 15 years old. The vegetation is dominated by *Albizia julibrissin* Durazz., *Carex basiantha* Steudel, *C. digitalis* Willd. var. *floridana* (L.H. Bailey) Naczi & Bryson, *C. kraliana* Naczi & Bryson, *Carpinus caroliniana* Walter, *Cercis canadensis* L., *Dichanthelium commutatum* (Schult.) Gould ssp. *joorii* (Vasey) Fernald, *Fraxinus pennsylvanica* Marsh., *Hypericum hypericoides* (L.) Crantz, *Liriodendron*



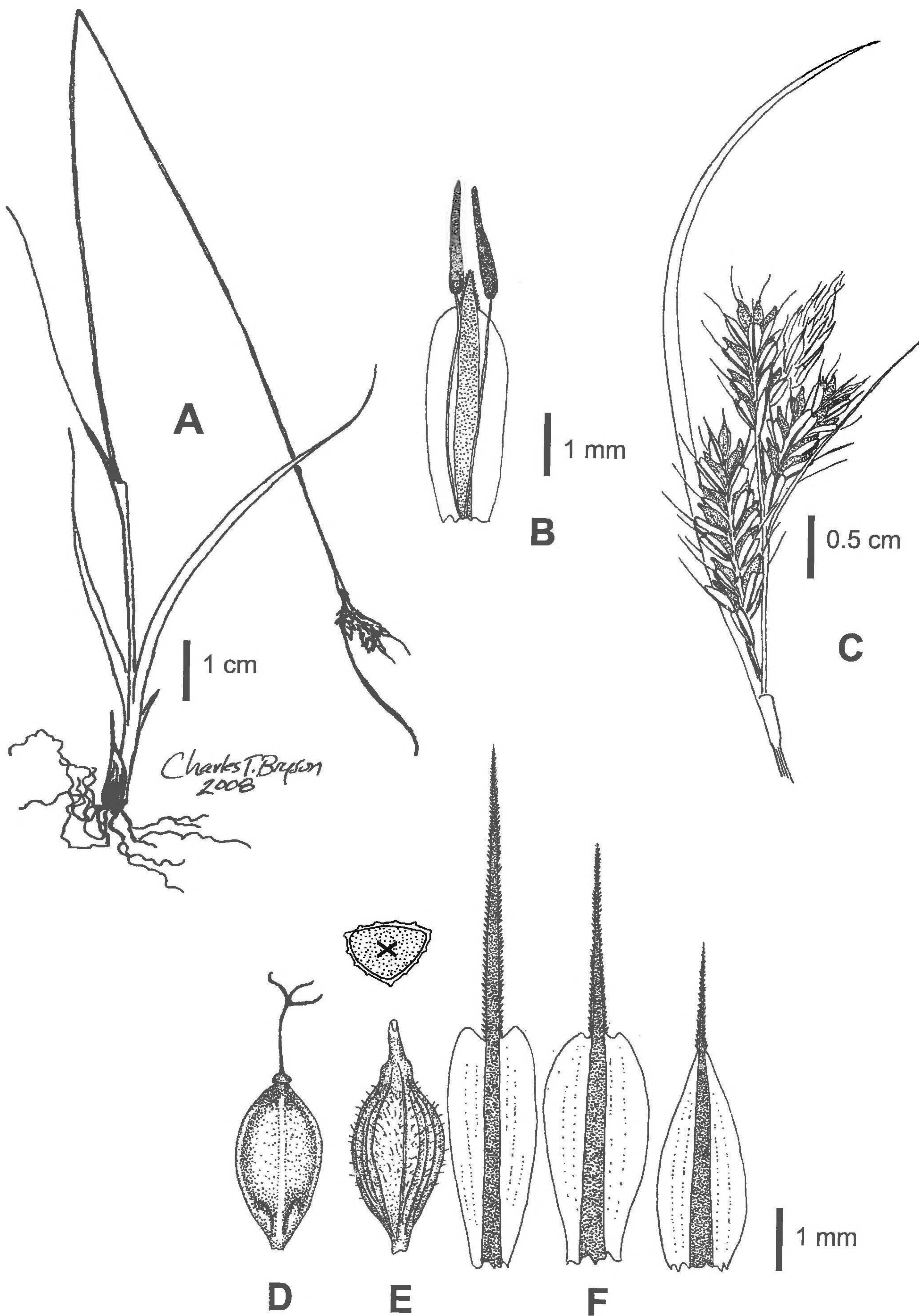


FIG. 1. Illustration of *Carex breviculmis*: A. plant habit (culm folded); B. abaxial view of staminate scale and anthers from midway on the staminate spike; C. inflorescence including subtending bracts and uppermost sheaths; D. achene with stigma and style attached; E. perigynium cross section (above) and side view (below); F. adaxial view of pistillate scales from proximal to distal (left to right) on the pistillate spike. B drawn from Majure 2119 *et al.* (ctb) and A and C–F drawn from Majure 2334 (ctb).



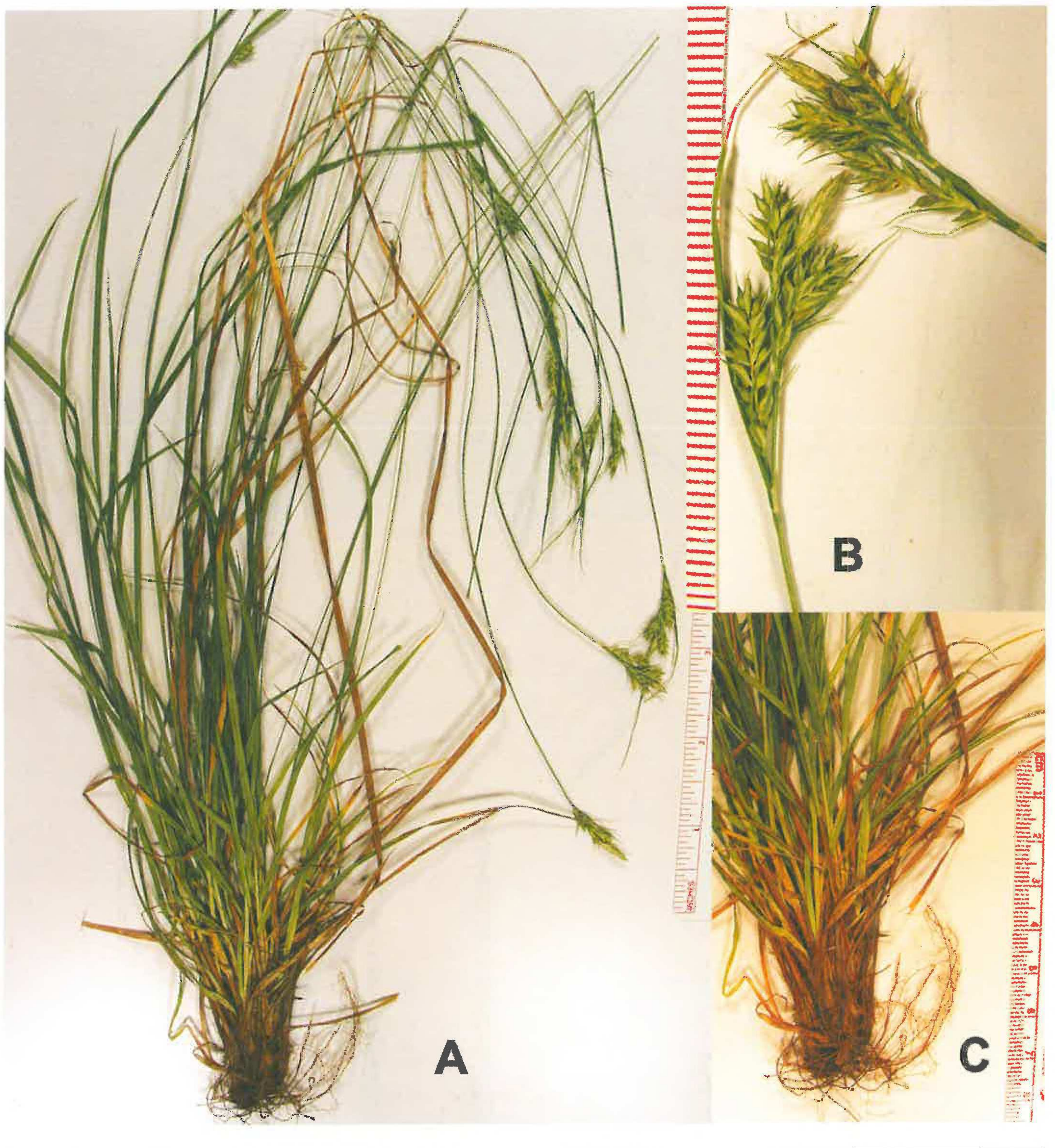


FIG. 2. Photos of *Carex breviculmis* R. Br. collected in Lauderdale County, Mississippi, *Majure 2334*: A. plant habit (culms folded); B. inflorescence; and C. base of plant.

*tulipifera* L., *Lonicera japonica* Thunb., *Luzula echinata* (Small) F.J. Herm., *Morella cerifera* (L.) Small, *Rubus trivialis* Michx. and *Symphyotrichum lateriflorum* (L.) A Löve & D. Löve. On December 23, 2007, when the first two sites were revisited, the densely caespitose clumps of this *Carex* species were still dark green and had not been killed by winter frosts.

Early in March 2008 and again in May 2008, *C. breviculmis* was collected at yet another cemetery in Meridian and from a highly disturbed vacant lot behind a fast-food restaurant. At the second and larger cemetery, Magnolia Cemetery Perpetual Care, thousands of *C. breviculmis* plants were observed in open and



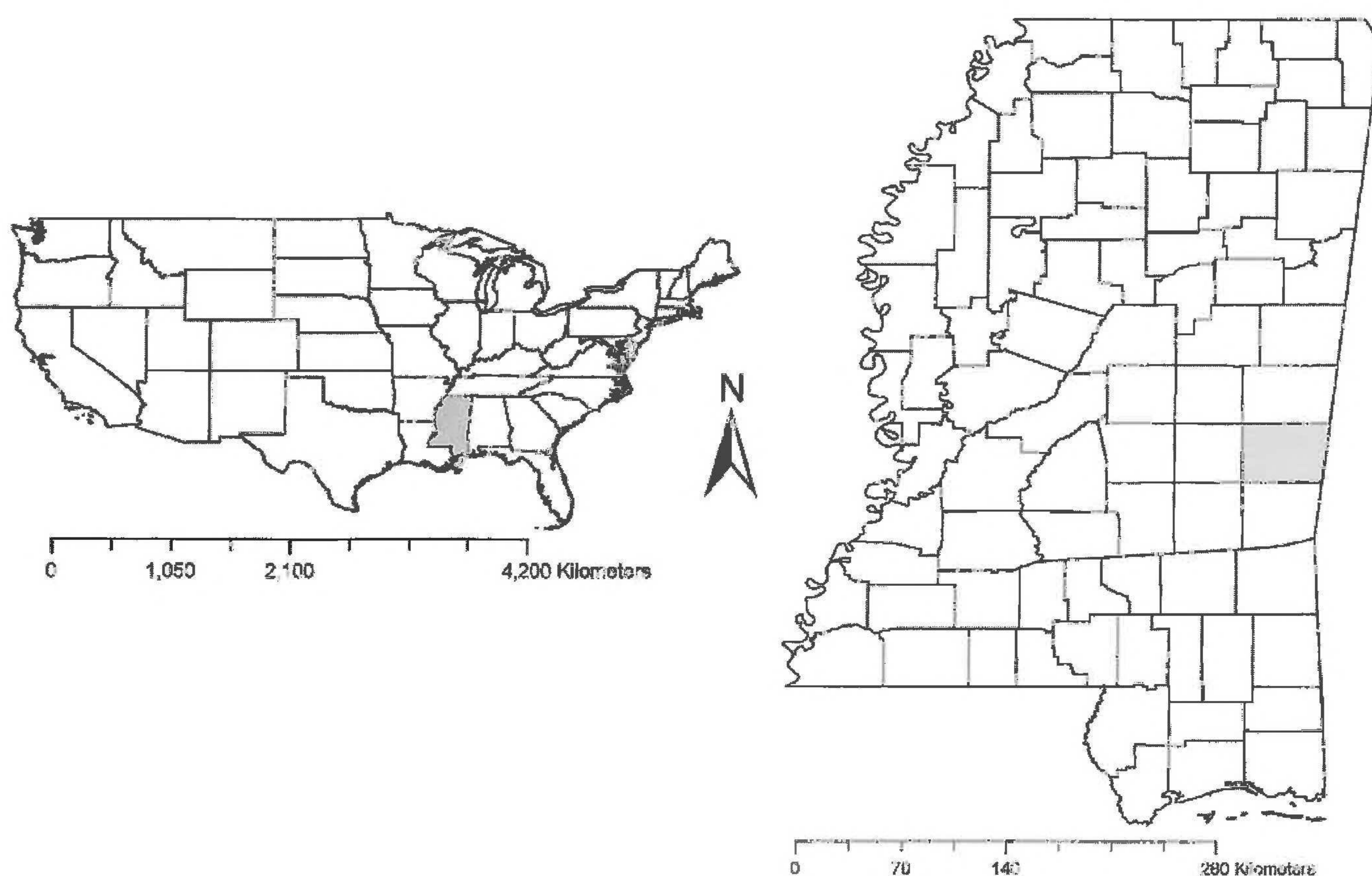


FIG. 3. The location of *Carex breviculmis* R. Br. in Lauderdale County, Mississippi, U.S.A.

shaded areas, even growing out of cracks in cement, around large headstones and around poorly mowed areas under large *Magnolia grandiflora* L. trees. The soils at both cemeteries ranged from sand to sandy loams, while those from along the trail and behind the fast-food restaurant were loam to silty loam soils.

We have observed a high degree of morphological variation in this species, even within the same population. Plants growing out of cement, headstones or in compacted, drier soils tended to be smaller than plants which were found near tree bases or in slight depressions. Also, the “lazy” culms of plants growing in open, short lawn areas tended to fall over and lay flat on the ground, whereas those growing next to some structure (cement, base of tree, etc.) tended to remain nearly erect or merely droop but not fall to ground level. It appeared that this could be advantageous to the species when growing in heavily mowed areas, in that sexual reproduction still could take place under such conditions.

Voucher specimens. **U.S.A. MISSISSIPPI. Lauderdale Co.:** Meridian at Gypsy Cemetery off of 8th St. at the junction with 40<sup>th</sup> Ave. 32.36384°N, 88.71913°W, 23 Mar 2007, L.C. Majure 2119 with C. Doffitt & J. Hill (MISSA, USMS, herb. Bryson); 10 May 2008, L.C. Majure 3214 with C.T. Bryson (FLAS, TENN, US); C.T. Bryson 22690 with L.C. Majure (BRIT, CHSC, DAV, DOV, DSC, FSU, GH, IBE, JSU, MICH, MISS, MISSA, MMNS, MO, NY, SWSL, TENN, UARK, USCH, USMS, VDB, VPI, VSC, WIN, herb. Bryson); S of I-20 E and Meridian adjacent to RR track just W of Mt. Barton at the end of frontage road. from 31<sup>st</sup> Ave. S 32.34856°N, 88.71904°W, 5 May 2007, L.C. Majure 2334 (DOV, FLAS, MISS, MMNS, MO, SWSL, VSC, herb. Bryson); 10 May 2008, L.C. Majure 3215 with C.T. Bryson (FSU, NCU, US, USMS, WIS); C.T. Bryson 22697 with L.C. Majure (BRIT, CHSC, DAV, DOV, DSC, FSU, GH, IBE, JSU, MICH, MISS, MISSA, MMNS, MO, NY, SWSL, TENN, UARK, USCH, USMS, VDB, VPI, VSC, WIN, herb. Bryson); Meridian, Magnolia Cemetery Perpetual Care off of 23<sup>rd</sup> Ave. ca. 0.5 km N of 20<sup>th</sup> St. and ca. 200 m E of northernmost entrance 32.38801°N, 88.69965°W, 15 March 2008, L.C. Majure 2877 (FLAS, MISSA); 10 May 2008, L.C. Majure 3213 with C.T. Bryson (BM, FSU, GA, LSU, TEX, US, USMS, WIS); C.T. Bryson 22685 with L.C. Majure (BRIT, CHSC, DAV, DOV, DSC, FSU, GH, IBE, JSU, MICH, MISS, MISSA, MMNS, MO, NY, SWSL, TENN, UARK, USCH, USMS, VDB, VPI, VSC, WIN, herb. Bryson); Meridian, Magnolia Cemetery Perpetual Care off of 23<sup>rd</sup> Ave. ca. 0.5 km N of 20<sup>th</sup> St. and ca. 250 m E from southernmost entrance 32.38571N, 88.69948W, 10 May 2008, C.T. Bryson 22688 with L.C. Majure (DOV, MO, VSC, herb. Bryson); Meridian, off of Frontage Rd. North adjacent to I-20 behind Arby's restaurant just S of Meridian and Bigbee Railroad and E of 18<sup>th</sup> Ave. S; 32.35774°N, 88.68607°W, 10 May 2008, L.C. Majure 3198 with C.T. Bryson (FLAS, MISSA); C.T. Bryson 22705 with L.C. Majure (SWSL, herb. Bryson).



## DISCUSSION

The source of introduction of *C. breviculmis* into the southeastern U.S.A. can only be speculated at this point. The city of Meridian was established in 1860 and has been an important railway center, where current intersecting railroads joined the city to the south as far as Mobile, AL and to the west as far as Vicksburg, MS (Allgood 1983). The *C. breviculmis* discovered in Meridian could have come into the country via goods being shipped from coastal ports into the interior U.S.A. by railway. One population of *C. breviculmis* is directly adjacent to the main railroad running through the city, and the other populations are located close to the downtown area, where the railway is not very far away. Also, the Meridian Air Force Base (Key Field) is within 1 km of one population of *C. breviculmis*. From the base, flights come and go from all over the world. Key Field is currently the home of the Air National Guard 186<sup>th</sup> Air Refueling Wing and the 185<sup>th</sup> Army Support Facility. It is possible that this species could have been introduced inadvertently as a “hitchhiker” on air-crew, troops, airplane machinery or cargo from Asia.

Another potential source of entry is the Rose Hill Cemetery, more commonly known as the Gypsy Cemetery, in Meridian. This cemetery has been the burial site for the Gypsy royal family since 1915 and has received many international visitors (Turnage 1999). The once Queen and King of the Gypsies in the U.S.A. and other Gypsy royalty are buried in the cemetery. Clothing and shoes of visitors or items brought to the cemetery for placement on gravesites could have been contaminated with seeds of *C. breviculmis*.

*Carex breviculmis* is cited as a weed (Moore & Edgar 1976; Moody 1989; Simpson & Inglis 2001; Global Compendium of Weeds list 2007; Bryson & Carter 2008) and has not been recorded as an ornamental (Bryson & Carter 2008) and does not seem to be in the nursery trade in the U.S.A. (A. A. Reznicek personal comm.). In the four localities where *C. breviculmis* has been found in Meridian, three of the sites contain relatively large populations ranging from thousands of plants at one cemetery to hundreds of plants at the other two, smaller sites. This species appears to be weedy in two of the largest cemeteries in Meridian, where it was common in *C. dactylon* and *S. secundatum* turf. Based on our observations, the size of populations, and the distance between sites, we suspect that *C. breviculmis* has been in the Meridian area for several decades. Additional surveys are needed to determine the distribution of *C. breviculmis* in Meridian and adjacent areas. Further dispersal of achenes and live plants is likely on contaminated mowing, construction, and grave digging equipment.

## ACKNOWLEDGMENTS

We thank the University of Florida Herbarium (FLAS) for invaluable library access and MO for specimen loans of *Carex breviculmis* (including *C. leucochlora*) and other closely related species in sect. *Mitratae*. We also thank Monica Arakaki for reviewing our Spanish abstract. We also thank Richard Carter, Gary N. Ervin, Robert F.C. Naczi, A.A. Reznicek, and David J. Rosen for helpful comments and reviews of the manuscript. This work was supported in part by funding from the USGS Biological Resources Discipline (#04HQAG0135) to Gary N. Ervin, Mississippi State University.

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